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SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
07/580,706	9/11/90		

EXAMINER	
ART UNIT	PAPER NUMBER
	11

DATE MAILED:

EXAMINER INTERVIEW SUMMARY RECORD

All participants (applicant, applicant's representative, PTO personnel):

(1) Eric W. Guttag/George W. Allen (3) Everett White (PTO)

(2) Pat J. Corrigan (4) Johnnie R. Brown

Date of interview May 28, 1992

Type: ☐ Telephonic ☒ Personal (copy is given to ☐ applicant ☐ applicant's representative).

Exhibit shown or demonstration conducted: ☐ Yes ☐ No. If yes, brief description: _____

Agreement ☒ was reached with respect to some or all of the claims in question. ☐ was not reached.

Claims discussed: all the claims of record

Identification of prior art discussed: all the prior art of record.

Description of the general nature of what was agreed to if an agreement was reached, or any other comments: The Attorney proposed to submit claim 61, that's attach, which more clearly define the invention. It is the Examiner's opinion that this new claim will require further consideration and further search. Mr. Corrigan explained the mechanism of the invention. Attorney Guttag questioned why US Patent No 5,043,438 and European Patent No. 383,404 were not applied against the claims. This may have been an oversight on the part of the Examiner.

(A fuller description, if necessary, and a copy of the amendments, if available, which the examiner agreed would render the claims allowable must be attached. Also, where no copy of the amendments which would render the claims allowable is available, a summary thereof must be attached.)

Unless the paragraphs below have been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW (e.g., items 1–7 on the reverse side of this form). If a response to the last Office action has already been filed, then applicant is given one month from this interview date to provide a statement of the substance of the interview.

☒ It is not necessary for applicant to provide a separate record of the substance of the interview.

☐ Since the examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action.

Everett White
Examiner's Signature

PTOL-413 (REV. 1-84)

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PROPOSED NEW CLAIM 62 FOR CASE 4233

62. A continuous process for preparing highly esterified polyol fatty acid polyester by interesterifying polyol containing more than about four esterifiable hydroxy groups and fatty acid ester of easily removable alcohol in a heterogeneous reaction mixture wherein said easily removable alcohol is removed, said process comprising an improvement selected from the group consisting of:

(1) the initial stage of the reaction is carried out in a continuous manner under conditions of backmixing to maintain a level of lower partial fatty acid esters of said polyol in an emulsifying amount;

(2) at least the final stage of the reaction is carried out in a continuous manner under conditions approaching plug-flow conditions after the degree of esterification of said polyol is at least about 50%; and

(3) a combination of improvements (1) and (2).

Support for new Claim 62: Claim 1, Claim 34 and page 23, lines 19-21.

(4233R3)

Interview for Case 4233

I. Applicants' Claimed Improved, Preferably Continuous, Processes for Preparing Highly Esterified Polyol Polyesters

A. Ten separate process improvements, plus combinations of these improvements. See Claim 1.

B. Claimed process improvements offer a number of significant advantages, including:

1. increased reaction speed and efficiency;

2. reduced/minimized formation of undesired/unwanted by-products;

3. reduced/minimized need to remove excess reactants/catalyst

4. greater conversion to desired highly esterified polyol polyester end products

5. easier clean-up of desired end products

6. reduced/minimized capacity/energy requirements for equipment used and increased process flexibility.

C. Handout Explaining Reaction Chemistry of Claimed Process Improvements (Pat Corrigan)

1. In general.

2. As it relates specifically to "backmixing" in initial stage and "plug-flow" in final stage(s).

II. Proposed New Claim 62

A. Recites continuous process involving:

1. "backmixing" conditions in initial stage to maintain emulsifying amount of partial esters;

2. "plug-flow" conditions in final stage(s) after degree of esterification reaches 50%; and

3. combination of "back mixing" and "plug-flow" conditions.

B. If allowable, Claims 14-16, 27-51 and 54-58 would be amended to depend therefrom.

III. The Rejection of Claims 1, 14-16, 27-51 and 54-58 under 35 USC 103 over Volpenhein, in View of Osipow et al, as it Relates to "Backmixing" and "Plug-Flow."

A. "Backmixing"

1. Requires: (a) continual recycling of portion of reactant mixture; or (b) carrying out reaction in agitated vessel(s) with continual addition of reactants and removal of product. See paragraph bridging pages 19-20 of Case 4233.

2. Volpenhein and Osipow et al nowhere teach reaction conditions that inherently involve "backmixing."

B. "Plug-FLow"

1. Requires (a) feeding output of initial stage into at least 2 CSTRs; or (b) use of continuous reactor, e.g., tubular reactor. See page 21, lines 27-33 of Case 4233.

2. Volpenhein and Osipow et al nowhere teach reaction conditions that inherently involve "plug-flow."

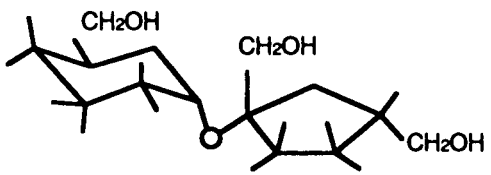
Sucrose Polyester

Reaction Chemistry

The sucrose polyester reaction has four main raw materials:

- **Sucrose**
- **Fatty Acid Methyl Esters**
- **Soap**
- **Catalyst**

Basic Sucrose Polyester Reaction



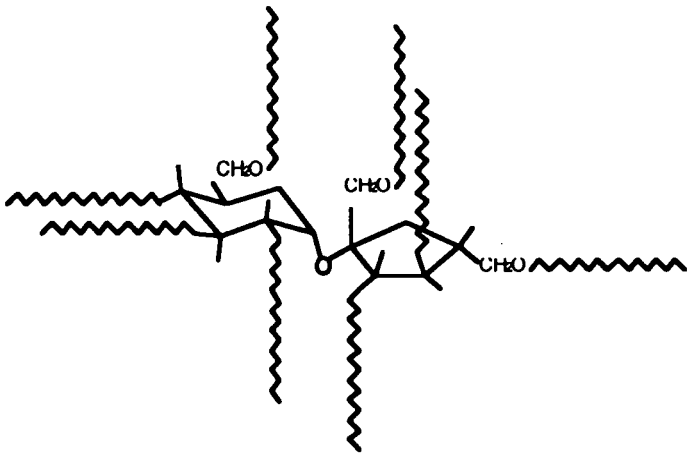
Plus

1 Equivalent of Sucrose

8 Equivalents of Fatty Acid Methyl Ester

Catalyst

Soap (Emulsifier)



Plus 8 Equivalents of Methanol

Sucrose Polyester

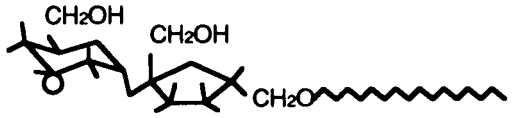
Sucrose Polyester Reaction Involves 2 Steps:

1. Solubilize the solid sucrose into the liquid methyl esters

2. Esterify the methyl esters with the sucrose

Materials that help solubilize the sucrose:

(Soap)



Lower Esters of Sucrose

<u>Both</u> are required

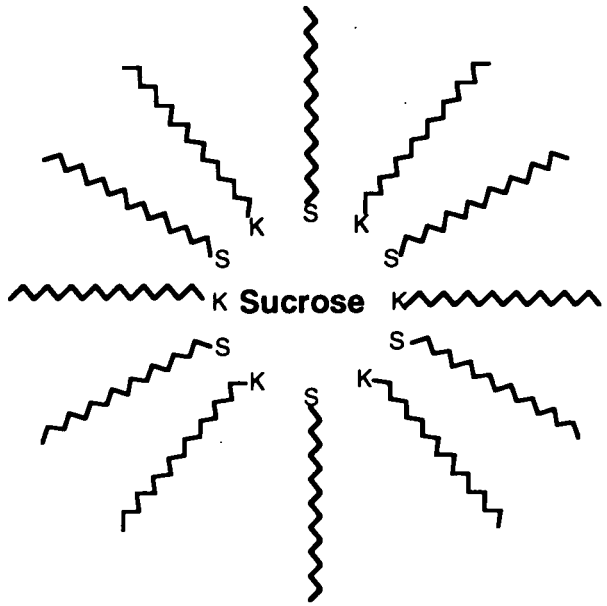
Inverted Micelles

S

Sucrose lower ester

K

Soap



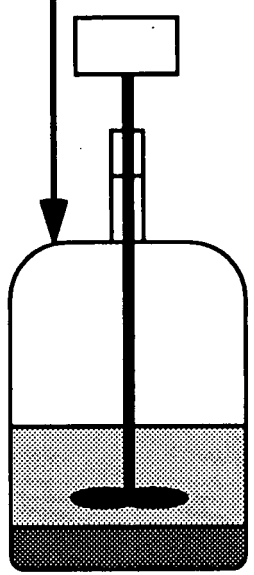
Batch Reaction

Sucrose

Methyl Esters

Soap

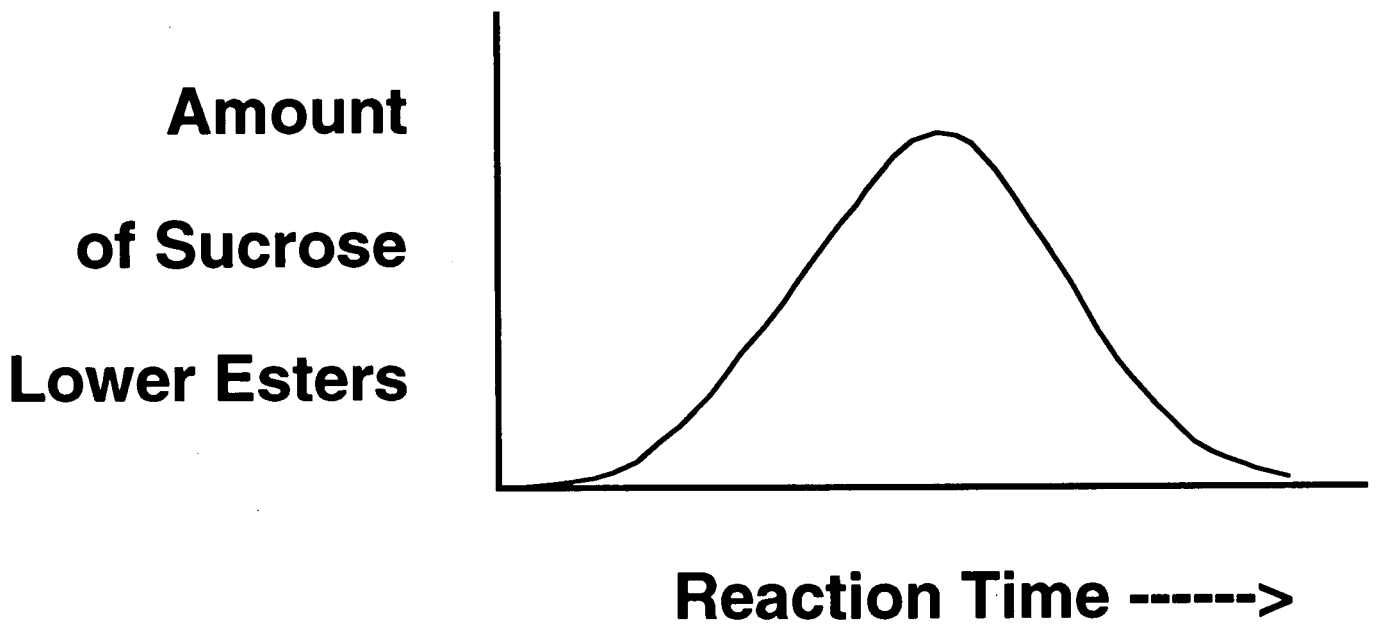
Catalyst



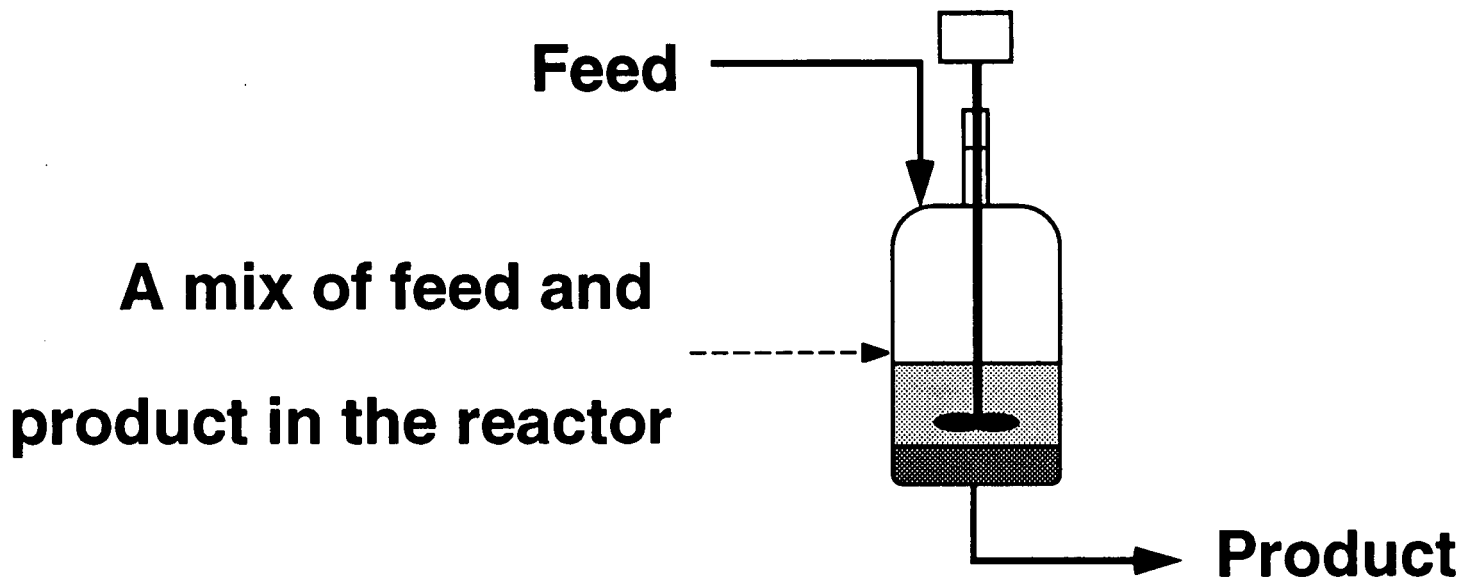
First part of the reaction:

Sucrose + Methyl Ester -------> Sucrose Lower Esters

Sucrose Lower Esters versus Time

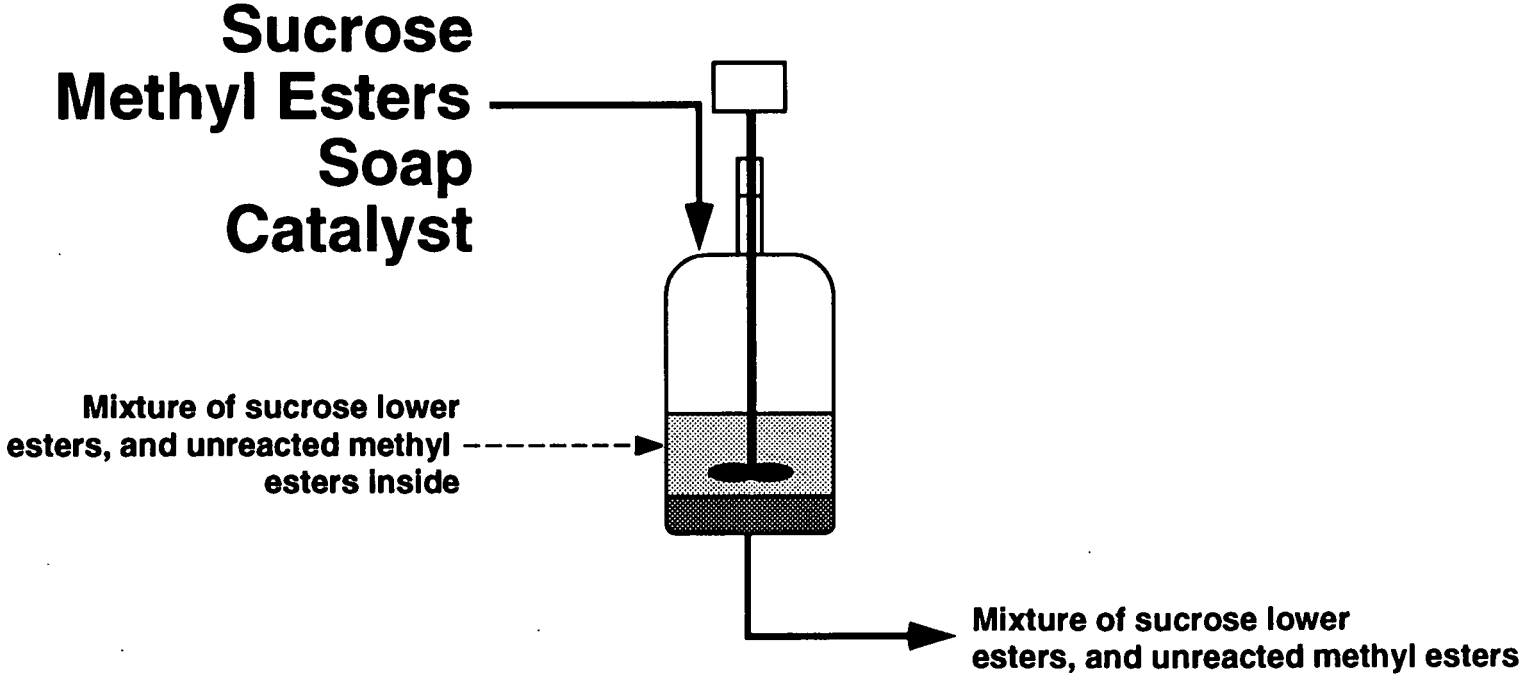


A Continuous Backmixed Reactor



A Continuous Backmixed Reactor

to Make Sucrose Lower Esters



Once the sucrose has reacted to sucrose lower ester, the basic reaction for the formation of sucrose polyester is:

sucrose ester + methyl ester -----> sucrose polyester + methanol

$$SE_i + ME \longrightarrow SE_{(i+1)} + MeOH$$

$$SE_i + ME \longrightarrow SE_{(i+1)} + MeOH$$

$$\text{Reaction rate} = \mathfrak{R} = \frac{k[SE_i][ME]}{[MeOH]}$$

There is an excess of methyl esters in the reaction:

[ME] -----> constant (with respect to $[SE_i]$)

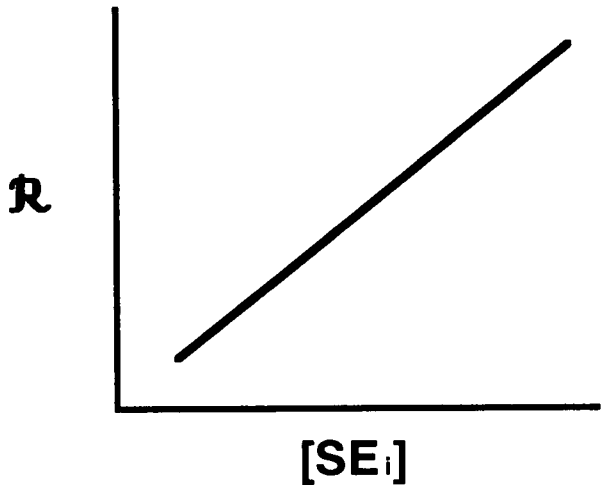
Methanol is continuously removed by vacuum:

[MeOH] -----> also constant with respect to $[SE_i]$.

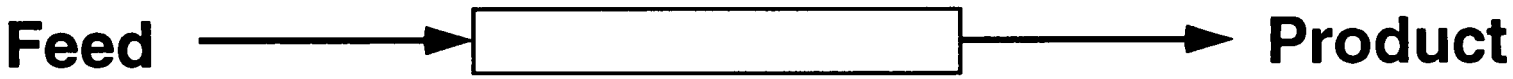
$$\text{Then: } \mathfrak{R} = K[SE_i] \quad \text{where } K = \frac{k[ME]}{[MeOH]}$$

$\mathfrak{R}$ is proportional to $[SE_i]$

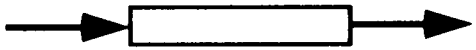
$\mathfrak{R}$ is proportional to [SE_i]



Plug Flow Reactor



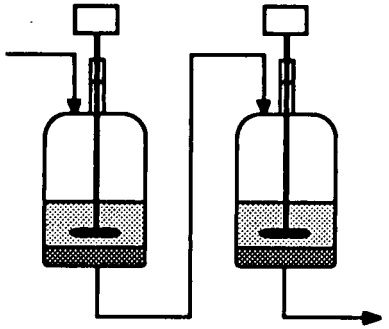
Plug Flow Reactor



a plug flow reactor

=

is equivalent to



2 or more back-mixed reactors

Final Conclusions:

The optimum method to run this reaction on a practical scale is:

1. Run the first part of the reaction in a continuous, backmixed mode;

2. Run the subsequent part of the reaction in a plug flow mode.